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Socio-Ecological Approaches to Integrated Landscape Management for Conservation Based Sustainable Livelihood For Vulnerable Tribes: Participatory Action Research For Developing Replicable Models

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Abstract: Socio-Ecological Approaches facilitated changes in social order for a well-crafted agronomic intervention of integrated landscape management and adoption of farming system by the particularly vulnerable tribal groups PVTGs like Birhore, Kamars, and Lodhas who belonged to the pre-agrarian society. The malnutrition, lack of opportunity for livelihood, degradation of natural resources, the impact of climate change necessitated launching of the project for Participatory Action Research to sensitize the tribes, build capacity and involve them as a partner for the development of social action and appropriate social institutions that helped in the successful organic farming. The success of such a conservation-based sustainable livelihood program tried initially in three landscapes was adopted in nine landscapes in three states of India as the "Replicable Model".

Keywords: Vulnerable tribes, participatory action research, livelihood, replicable models

INTRODUCTION

The Scheduled Tribes accounts for 8.6% of the total population (Census 2011) of the country. They have long suffered social and economic marginalization. Since independence, efforts have been made to bring them under mainstream development initiatives through various programmes, projects and schemes for balanced growth and economic development. However, after successful completion of four five years and three annual plans, it was recognized by the policy makers that the Scheduled Tribes (STs) are still way behind in terms of health, education and other socio-economic indicators. The Tribal Sub Plan (TSP) was initiated during Fifth Five Year Plan to have a focused emphasis on the holistic development of the tribal areas and the Tribal communities and to lessen gaps between the STs and general population in health, education, communication and other areas of basic amenities of life by providing legal and administrative support. TSP pays special attention to Particularly Vulnerable Tribal Groups (PVTG) and tribals with special needs.

The "Primitive tribal group" sub category within the Scheduled Tribes was created during the Fourth Five Year Plan. They are identified as the groups belonging to the lower level of development and the purpose of creating such sub category was to improve the conditions of these communities (Patel B. M., 1998). These groups show the features of a pre agrarian system and practice mainly hunting and gathering for their subsistence and also some other allied activities in recent days (Sarkar R.M., 2008). Besides they also mark zero or negative population growth and suffer from extremely low level of literacy in comparison with other tribal groups (Bagchi, Gupta 2005; Chaudhuri, 2005). Due to different

geographical distribution, their economy and whole culture show varied traits. There are 75 tribal communities in India who are recognised as PVTG (Particularly Vulnerable Tribal Group) and are spread over 18 states and one Union Territory (Ministry of Tribal Affairs, GOI). The Ministry of Tribal Affairs, Government of India prioritized their protection and development in terms of health, education, livelihood and nutrition in a comprehensive manner while retaining their culture and heritage and reduce their vulnerability.

There have been various efforts initiated to improve the socio economic conditions of the tribal communities in general and the PVTGs in particular. Besides, dedicated institutional mechanisms like ITDA/ITDP, TRIFED, NSTFDC, LAMP etc are created to promote economic empowerment and welfare of the tribal population. Apart from the various schemes and programs, two landmark Acts, FRA 2006 to empower the tribal people with legal land rights to ensure their livelihood security and PESA 1996 to empower them to have access and control over the biodiversity resources for sustainable utilization are directed towards social inclusion and economic empowerment.

The scheme for Special Central Assistance to TSP is meant to support the efforts of the state governments/Union Territories for the overall development of the STs and is meant for family oriented income generating schemes related to agriculture, horticulture, animal husbandry, forestry, soil conservation, minor irrigation, education, cooperation, small scale industries etc again with a focus on PVTGs and dispersed tribal groups for whom 10% of the SCA are set apart.

But despite all such efforts the Human Development Report 2011 of Planning Commission states the poor human development index of the tribal population in terms of health, education and income index and more so among the PVTG (Statistical Profile of Scheduled Tribes in India 2013).

Introducing the farming system and agricultural practices to the PVTG, a well known pre-agrarian society requires participatory intervention in the form of action research at the interwoven socio-ecological process as natural phenomena for sustainable food production.

SOCIO-ECOLOGICAL APPROACHES TO INVOLVE THE COMMUNITY IN DEVELOPMENT PROCESS

The functioning of the ecosystem determines the sustainability of food production as one of the ecosystem services. The knowledge, attitude, and socialization of the community determine the nature of farming practices they would adopt to produce crops. Moreover, the production of quantity and quality of crops in the agriculture land depends upon several agronomic factors. Whether the PVTGs would follow the sustainable agricultural practices of mixed farming, apply organic manure, go for multiple species management, crop rotation, pulse cultivation depends upon the approaches to understand their world view, change of behaviour, process of acculturation and adoption of technology as a matter of pride in their own social system.

Such change in the culture for adoption of conservation based agriculture practices or any such livelihood practices should be compatible in the framework of the ecosystem of their own landscape of habitation.

It is very interesting to see how traditional practices of the community had the ability to reduce social-ecological crises, particularly risk mitigation in the events of some natural disasters in the past and now adoption of new farming practices at the advent of deforestation and climate change through the approaches to capacity building and handholding support.

The purpose of the action research is not only to study and document the issues of the socio-ecological processes which has caused lower Human Development Index among the tribal community but find the scope of food security and opportunity for livelihood, particularly for landless, food gatherers and small landholders and intervene to demonstrate the improvement to change their pre agrarian state compared to the starting point of baseline data.

THE RATIONALE FOR THE PARTICIPATORY ACTION RESEARCH AND ITS BACK-GROUND

While the natural habitat as the landscape ecosystem is the foundation for sustainable human development of the tribal community, there is strong evidence that many of these resources are facing degradation and the tribes have been facing malnutrition, particularly where tribes like Kamar (Mitashree et al 2006) in Chhattisgarh and Birhor (Pandey et al 2000) in Jharkhand mark their habitat. Most of these tribes are landless and they do not have a source of sustainable subsistence, except NTFP collection and working as wage labour nearby.

It is required to develop a comprehensive set of alternative management design that are functionally linked for landscape analysis and find the relationships between production of resources and ecological values (Basknet and Yolasiğmaz 2000). To revive the natural habitats of the tribal communities an Integrated Landscape Management approach is needed that ensures management of production systems and natural resources in an area large enough to produce vital ecosystem services and small enough to be managed by the people using the land and producing those services (FAO, 2013). The rural landscape of tribal habitats normally consists of agri – forest mosaic and is multi functional in nature. A multi-functional landscape simultaneously meets a full range of local needs right from ensuring water availability, biodiversity, producing nutritious and profitable crops and enhancing human health through clean water and air (Thaxton et al. 2017).

The issue of tribal livelihood, poverty alleviation and food security can not be addressed with sectoral approaches of land management. Rather there has to be a link developed between agriculture, forest, water and other sectoral landscape level activities, the institutions and policies (Reed et al. 2015). Strategies need to be developed that support the delivery of multiple benefits from rural landscapes by increasing synergies and minimizing or mitigating tradeoffs among food production, biodiversity conservation, ecosystem service provision, and poverty alleviation (Estrada-Carmona. 2014).

The action research initiated by IBRAD (Indian Institute of Bio Social Research and Development) involves situation analysis, understanding of the tribal landscape and indigenous traditional knowledge of the tribes blended with scientific principle and development of the strategy for non destructive harvesting of plant species, transfer of appropriate technology that can help the tribes in value addition of non timber forest produces (NTFP), adopting organic farming on the forest fringe villages to ensure sustainable livelihood. The study by the members of IBRAD has revealed that traditional knowledge is relevant in any fields of natural resource management (Mukhopdhyay et al 2015).

It is also important to involve the government functionaries in the project at the field level and organize periodical meetings with the district level/state level functionaries to provide feedback about the challenges and accomplishments of the projects. The challenges of conservation based livelihood development can be addressed by designing effective community based social institutions and integrate them with the government institution through BMI (Bilateral Matching Institution) that can lead to biodiversity conservation and contribute towards human well - being (Roy 1992, Roy & Mukhopadhyay 2015).

Women in a tribal society play vital role in all sphere of life including both the socio cultural and economic but still are lagging far behind in the areas of education, employment and good health (Heggade et al 2017). The action research with intervention has been designed with a multifaceted, multi-dimensional and multi-layered concept where the process of women empowerment have the visible role of women in managing resources, the share of control over the material, control over decision-making in the home, community and in the society.

Role of women empowerment in Sustainable Livelihod: Broadly, empowerment means individual acquiring the power to think and act, freely exercise choice, and to fulfill their potential as a full and equal member of society. The United Nations Development Fund for Women (UNDFW) includes two factors in its definition, acquiring Knowledge and understanding of gender relationships and the way in which these relations may be changed. Developing a sense of self-worth, a belief in one's ability to secure desired changes and the right to control one's life are the parameters of women empowerment.

The main objective of empowering the tribal women through Natural Resource Management based livelihood support is to create more and more awareness in a field like conservation of biodiversity from the forest, agriculture and livestock, creating an enabling environment for tribal women that promotes equal opportunities, eliminates discrimination and ensures empowerment through changes in societal attitude. These programmes benefit tribal women in nondestructive NTFP harvesting, value addition, marketing, sustainable agriculture, and organic farming. Thus it facilitates the process of shifting the condition of the PVTGs from the pre agrarian state to adoption of new technologies for land based activities and organic cultivation practices.

Entrepreneurship and Skill Development for mobilizing and imparting skills pertaining to local employment/ livelihood opportunities to school drop-outs, adolescent girls, housewives, and rural youth are promoted for diversification and strengthening of livelihood opportunities.

Indicators of Women Empowerment as Facilitator of livelihood Support: The empowerment process to facilitate the livelihood can be broadly quantified. Various authors have used education, work participation, and exposure to mass media, the means or sources by which women are expected to develop decision-making authority for the activities related to livelihood, mobility, decision making power, autonomy, ownership of household assets, freedom from domination, contribution to family income, exposure to information, and participation in development programmes as the indicator for women empowerment (Chung et al 2013., Biswas et al 2004.,) It has been observed during the interventions made by IBRAD, how Sumita of the village in Debardanga of Bankura, Laxmi in Tiyakathi village of Jhargram, Jayanti in Buridih village in Purulia of West Bengal have demonstrated greater freedom of movement, autonomy, and attitudinal changes in favour of livelihood not only for their family but escalated the activities of the other families for training to promote the organic farming, as indicators to measure empowerment. Education is an essential foundation for all social, economic and cultural development (Sen, 1994) that enhances the human capital and economic prospects of a country (UNFPA, 2005). Investment in women's education results in an improved status through improved economic prospects, greater decision-making authority, control over resources, exposure to the modern world, husband-wife communication, and self-reliance in old age, and reduced restrictions on physical mobility (Moser, 1998). A mother's education is linked to better reproductive health and a reduction in young children's mortality rates (Jejeebhoy, 1996; UNFPA, 2005). Education is also likely to enhance women's economic independence by equipping them with the skills necessary to take advantage of paid employment opportunities. Labor force participation not only gives women an opportunity to earn income but also exposes them to the outside world.

Hindrances to Empowerment of Tribal Women: The literacy level of tribal women is only 53.7% (Census of India 2011). Many of the tribal women do not know the official language of the state which creates a big hindrance to express their view in the meeting of local affairs. Tribal women are not aware of the collective rights of their lands and forests recourses, availability of the resources may be obtained to maintain the family's livelihood. All these act as drivers for disempowerment of tribal women.

WOMEN AS COMMUNITY RESOURCE PERSON (CRP)

Considering the large and expanding population in general and the socio cultural context of the tribal community in particular it is very difficult for the government departments and the research institutions to reach to all sections of the people and develop their knowledge and skills for solving real life problems. The problem becomes more aggravated as most of the departments and institutions are facing shortage of field level staff and extension personnel. It is felt that the gaps can only be reduced by initiating a community led approach to disseminate the information by the farmers themselves to their peer group and to provide hand holding training to them. IBRAD has initiated a unique program of capacity building, training and developing Community Resource Persons from among the tribal women. It is a unique program blended with residential and on field training of the identified women who have good communication skills and have the ability to make people work in groups. The training delivery mechanism is designed in a unique manner. The training addresses strengthening the livelihood activities of the trainees during the process of training itself through application of

the new skills such as establishment of organic kitchen gardens, seed bed preparation, seed treatment production of vermi compost, production of organic inputs like Neemastra, nursery raining in their own land as demonstrative models. It helps in increasing their earnings during the training only. It also motivates other villagers to join the training and apply the skills.

It is encouraging to note how Sunita and Sarita from the Birhor PVTG of Dhengura village, Jharkhand has facilitated the process of establishing kitchen gardens, community nursery, plantations of fruit plants in their villages. They are assuming a transformative role in their villages by introducing new land based livelihood opportunities in their homestead land and adjoining fields which otherwise used to remain vacant throughout the year. They are assuming the role of change agents to motivate the fellow villagers to adapt new techniques, build their capacity to apply new skills and practices and also to provide hand holding support for application of the skills. The initiatives of Sarita and Sunita even drew attention of the sarpanch of the local panchayat who paid a visit to Dhengura village to appreciate their efforts. Thus the training not only changes the livelihood options but also the mobility of the women to network with different departments and institutions.

The role of these women CRPs are not limited to their villages only as has been found in case of Sumita of Debardanga village Bankura, Laxmi of Tiyakathi village Jhargram and Jayanti of Burudihh village Purulia in West Bengal who are identified as the resource persons by the Block Development Officer for training the women SHG members under the block.

METHODOLOGY FOLLOWED FOR IMPLEMENTATION OF SOCIO-ECOLOGICAL APPROACHES TO INTEGRATED LANDSCAPE MANAGEMENT FOR CONSERVATION BASED SUSTAINABLE LIVELIHOOD PARTICULARLY FOR THE PVTGS

As the action research is conducted involving particularly the PVTGs who generally lack formal education and exposure, are shy and do not open up freely with the outsiders, are engaged mostly in daily wage based activities and are constrained to spare time, it is utmost important to apply a participatory methodology to develop a trustworthy relationship with them first and involve them in changing their world view for adoption of new technologies. Participatory methods are such where the subjects of the research become involved as partners in the process of the enquiry and a trustworthy relationship is developed between the researcher and the researched. More importantly, participatory researchers act as facilitators to enable the local people not only to analyse their own situation and problems but also come out with the solutions to the problems and its implementation.

Situation analysis of the causal-effect of degradation of natural resources and mapping of the landscapes through PRA

The process starts with the Situation analysis of the causal-effect of degradation of natural resources and mapping of the landscapes through PRA (Participatory Rural Appraisal). It is an exploratory method to understand the drivers of degradation of the natural resource base and the habitats of the community and its impact on the life and livelihood of the PVTGs like Kamar and Birhors. Participatory Rural Appraisal methods are used to understand the drivers of degradation and the causal relations between the degradation of the natural resources and the livelihood and food security issues and mapping the landscape to identify the issues and the potentials for interventions as well.

During the process qualitative tools like **Participatory observation method** is used for collecting data on naturally occurring behaviors of the communities in their usual village contexts.

Focus group discussions (FGDs) are conducted in generating broad overviews of issues of concern to a representative group within the community like women groups, NTFP collectors, wage laborers etc. Such FGDs are conducted to assess the perspective of different representative sections of the community.

During the process it was found how due to resettlement in the colonies the Birhor community members of Demotand and Dhengura villages of Hazaribagh district, Jharkhand have to adopt rope making by using the plastic threads of the

cement sacks. As they have moved out from their traditional forest habitat they could not collect the natural fibers. It has impacted both on their cultural identities and the economic activities. It is also found among the Kamar communities in Kouabahara and Kesodar villages in Chhattisgarh that how they are facing the challenges of procuring bamboo for maintaining their traditional craft of basket making and even have to cover a distance of 20 km to procure bamboo.

Create awareness to improve conservation and sustainable development by creating a new social order through proactive social change agents SICO (Self Initiated Community organizers) to facilitate appropriate social institutions with a regulatory mechanism to create a new social order and system

The Eco Chain – PANCHATATVA method is field-tested and has been recognized internationally (Method factsheet, 2016). Eco Chain – PANCHATATVA is an approach to raise the awareness of local people with respect to the interdependence and relationships between different components of ecosystems, like forest, agriculture, water, livestock and human being in a given landscape which is interconnected like a chain. The approach aims to motivate people, as this has been already demonstrated in Demotand and Dhengura villages involving Birhore Tribes and Kouabahara and Kesodar villages involving Kamar tribes. This blends scientific principles with indigenous knowledge and includes the participation of the stakeholders in:

(1) Identifying the problems,

(2) Assessing the available resources and trade-offs

(3) Setting the goals, and

(4) Developing action plans to reach their goals.

The method effectively involves local communities in finding solutions to arrest ecosystem degradation such as deforestation, which has its primary immediate negative impact on the indigenous local communities themselves. It encourages local communities to spontaneously take responsibility to act and to monitor progress. Furthermore, including indigenous knowledge helps to build synergies between different approaches for conservation, organic agriculture and sustainable livelihood.

After the eco chain exercise at Kouabahara village, Chhattisgarh the SICO members have formed Jai Maa Seetala group for implementation integrated landscape management in their village. Similarly Somar Birhor, Santosh Birhor, Babulal Birhor, Kailash Birhor and Kupni Birhorni of Demotand and Sarita Birhor, Geeta Birhor, Sonia Birhor, Sunita Birhor, Mamta Birhor of Dhengura village in Jharkhand has come forward as the SICO members.

Prashikshan Shivir as Outreach Centre

After the initial exercise of "PANCHATATVA" and identification of SICO, a Prashikshan Shivir has been established as Outreach Centre in the line of Farmers' Field school. The Farmer Field School is a non formal learning activity conducted following the principles of adult learning and facilitates the process of learning by the farmers through field observation and experimentation (TNAU Agri tech portal) and is widely practiced by the agriculture departments. The Prashikshan shibirs established in the PVTG villages act as "Open Class Rooms" with adjoining demonstration plots where improved techniques of organic cultivation practices are demonstrated and practiced. These Prashikshan Shivirs are used for continuous in situ learning of the farmers based on the seasonal crop calendar.

Bilateral Matching Institution and its implementation

No development project will scale up unless both the community and government functionaries work together for a common goal and agreed plan of action. But sometimes the community institutions and the government institutions diverge over how to achieve similar ends of sustainable harvesting the forest produce, resulting in conflicts. Conflict sometimes is found for a particular issue of conservation of the forests between the bureaucratic institution of the Forest Department (FD) and the Tribal Forest Communities (FC) in India and elsewhere in the world. The authors find a solution through the exercise of

eco chain approach (oppla.eu) also known as PANCHATATVA for participatory biodiversity management. Such methods to resolve the conflicts is a strategy of what has popularly known as Bilateral Matching Institutions (Roy, 1992., Roy et al 2015). Through fieldwork among the PVTGs, generating among them an awareness of their own capabilities and of similarities of their ultimate aims and those of the FD, and thorough training of the FD and the FC members by getting them involved in such fieldworks and changing their outlook on the problems of FCs and their capacities for problem-solving, this matching is accomplished. A few instances presented here show that this matching is a process based on equality between the followers of both community and government institutions and their mutual appreciation of each other's goals and problems

> In view of the need of the Bilateral Matching Institutions (BMI) meeting with the State level officials, District level and block level and organizing workshop with line department officials to make them aware of the goal and approaches to involve them in getting their support is essential.

To achieve the goal of BMI, a meeting with Sri Ranendra Kumar IAS, Director, TRI, Ranchi, was organized on the 23rd Sept 2019 for sharing the approaches of sustainable tribal development. Sri Kumar shared his views that in order to develop the Tribes like Birhore, we need to involve them in natural resource management and Agriculture. It needs cultural change and making them self reliant. Moreover, the development projects of Birhor or any other PVTG cannot be successfully implemented in isolation. We have to involve the neighbors also. A district-level workshop is organized with the forest officials and line department functionaries to share the approaches and concepts of Forest Mosaic Landscape Management in the context of sustainable livelihood of the Birhor or any PVTGs. Discussion in both Jharkhand and Chhattisgarh were on the common issues of Sustainable Livelihood of the forest fringe dwellers, farmers, Tribes in particular who receive different types of tangible and intangible benefits at various scales in the form of forest produces, orchards- fruits, agricultural products, livestock, pastures, water bodies as means of the livelihood which need special attention for human well being. There is no such study and intervention as action research to illustrate how a particular Tribal landscape ecosystem, its associated ecosystem services, and livelihood have improved in tandem.

Preparation of village-level integrated landscape conservation plan by involving the SICO members and other members of the community and the line departments

Sustainable Tribal Development & Sustainable Forest Mosaic Landscape Development is interdependent. Tribal social system, social order, and cultural practices are related to Natural Forest Ecosystem**.**

The forests, agriculture farm, livestock, waterbody together form an interdependent mosaic ecosystem and these cannot be managed in isolation. It requires an integrated landscape management approach. Sustainability of the natural production system on the forest fringe mosaic landscape is important for sustainable livelihood and human well being of the Tribes and we cannot imagine working for Sustainable Tribal Development ignoring the degradation of natural habitat of the Tribes.

Integrated mosaic landscapes are the places where forests and non-forest land-use coexist as a functioning ecosystem in a mosaic pattern. The boundary between forest and agriculture is fuzzy in space and time.

Accordingly the Landscape Level Conservation Plan is prepared taking the village as the unit with active participation of the Birhor, Kamar and Lodha community members in the states of Jharkhand, Chhattisgarh and West Bengal. For optimization of conservation impact, productive potentials of the natural resource base and the livelihood options for the community, all the essential components of the landscape need to be developed in a systematic manner.

These steps for implementation of Landscape Conservation Plan includes

(i) habitat, biodiversity conservation (in particular) and development – The promotion of organic kitchen gardens, Agro forestry and Community Nursery raising is planned accordingly

(ii) On-farm facilities for input production to make the community self reliant for the agri inputs and also explore

options for alternate livelihood through sale of the inputs – The production of vermi composts, Neemastra, Panchaagabya, Amrit Jal etc are planned accordingly

(iii) Cropping sequence and combination planning – As the Birhors and Kamars are yet to practice agriculture in their field, they have to learn the techniques of crop planning and combination/mix cropping to have sustained flow of food.

(iv) Annual crop rotation plan for the kitchen garden

(v) Growing of crops suiting to the specific region, soil, and climate.

Based on the Landscape Conservation Plan strategic planning is made to implement the activities as per the identified locations in the villages by involving the villagers themselves.

Identify the options and conditionality of the sustainable livelihood of a common interest group (CIG)

The SICO members of the villages have formed Common Interest Groups (CIG) to start activities like nutrition kitchen garden, community nursery, organic inputs production etc.

Capacity building of the community members, particularly women and youth through training and skill development for sustainable livelihood development for food and nutrition security

Women and girls are often excluded from the training and education (World Bank 2011) which is more pertinent for the tribal women and girls. Understanding of social cognitive theory is essential to develop the strategies and modules for capacity building both at the individual and community level. The process of capacity development has to be sensitive to local culture that has a strong influence in constructions of knowledge and meaning making (Vygotsky 1978). Social interaction is considered as the factor that influences a person's cognitive development by emphasizing the role of guided and observational learning through social modeling (Bandura 1998). Accordingly the strategy and modules for capacity building of the PVTG members particularly of women and girls from the Birhor, Kamar and Lodha tribal community is designed and a series of capacity building and skill development activities have been implemented for the community with a special focus on women to develop their skills related to seed bed preparation, seed treatment, establishing organic nutrition kitchen garden, production of organic inputs like vermin compost, neemastra, nursery raising, plantation techniques etc. The trainings are conducted following the Adult learning principles and in the mode of skill development training conducted in situ in the prashikshan Shivir by the facilitators of IBRAD. After the first round of training selected members are identified from among the women to be groomed as Community Resource Person and they have received an advanced training for three months. The trainings are conducted in such a way that immediately after the training the members implement the skills learnt in their own field with small inputs like seeds and bio fertilizers provided by IBRAD. This helps in confidence building, conviction on the new technologies learnt and provisions of increased income while getting the training itself.

Thus these capacity building modules have a multilevel construct that includes both processes and outcomes. Such outcomes become evident when these trained women like Sunita and Sarita Birhor of Dhengura village in Jharkhand, Mamta Bhukta, who belongs to Lodha community of Chhoto Tiyakathi village in Jhargram West Bengal have started demonstrating the skills in their villages and have provided hand holding support to the fellow villagers.

Enhance women's empowerment to facilitate social change

Empowerment is both a process and outcome. Different studies show the role of peer networks for shared understandings, group aspirations and collective confidence building for empowering the women (Eger et al 2018) and capacity development can be designed in this context. The desirability and feasibility of kinds of empowerment depends to a large extent on cultural specificity. This requires understanding on how the women perceive their choices and have the ability to act in the given social construct. Empowering women includes the process of developing their capacity to aspire

for change. An increased sense of control and shared purpose supports the development of aspirations and "can unlock the agency that is needed" (Conradie & Robeyns 2013).

One of the important approaches adopted by IBRAD to empower the women and girls belonging to the Kamar, Birhor and Lodha PVTG has been to develop a peer network of likeminded people through SICO and help in developing their collective confidence through developing capacity of the women as community resource persons and agri-entrepreneur. They have been considered as a family unit and not as a woman alone for promotion of horticulture production in their homestead land as the nutrition kitchen garden, integrated farming system, nursery raising, and seed production. Their capacity is also built for off-farm based business activities like sale of saplings of nursery organic manure and compost, bio pesticides, seeds, etc. The hand holding capacity building training and opportunities for application of the skills immediately after the training has been found effective. The successes of interventions in the demo plots of the community resource persons have ignited group aspirations for adoption of such practices. The women have started exercising their choices through establishment of organic kitchen gardens in their homestead land, production of organic inputs as they felt "increased sense of control'' in their production functions through access of knowledge, skills and technology that has certainly unlocked their agency to challenge the typical gender stereotypes.

Promotion of organic kitchen nutrition gardens in PVTG households involving the women and youth

After being trained both the Kamar and Birhor tribal members have started organic kitchen gardens in the lands adjoining their homes used to lie vacant throughout the year. These are mostly women led and women managed. The vacant lands are now put into productive use and people are getting fresh vegetables for their families as nutrition support.

Not only the women have started the kitchen gardens even they have their own innovations for managing them more effectively. Gauri Bai Kamar at Kowabehera in Chhattisgarh have dug up the soil in the middle of her kitchen garden for storing water for watering the plant as well as maintain the soil moisture content. Suman Bai Kamar of Kouabahara village has started producing variety of vegetables in her kitchen garden with increased production and yield after application of biofertiliser like azophous foor seed bed preparation. The garden of Fuluram Kamar of Kesodar village in Chhattisgarh demonstrates the model of mixed cropping with introduction f beans for nitrogen fixation. Sarita Birhorni and Sunita of Demotand village has come forward to orient others and ensure that the kitchen gardens are maintained properly.

Establishment of community nursery and tree plantation

Two community nurseries are established in Dhengura and Demotand villages with active participation especially from the women members to explore possibilities of diversification of livelihood through production of planting materials.

Plantation of fruit bearing trees like mango, cashew nut, guava etc is done in the open areas of Dhengura village.

Enhanced mobility of the women results into confidence building

Mobility is another indicator that helps in empowering women. There were women and even the adolescent girls from the Birhor communities of Dhengura and Demotand villages in Jharkhand who have volunteered to come to Kolkata to attend the National Convention held from 14 – 16 February 2020. It was the first time that they were out from their village. Their exposure with the outer world has made them enthusiastic and confident.

Application of ICT tools for monitoring

The frequency of communication, its quality, and its reach among farmers will have a greater impact on the management of the Project. Information and communication technologies (ICT) such as WhatsApp, video, and cell/ smart phones have been used for getting daily feedback from the field by the CRP and field facilitators for monitoring of the activities and taking timely corrective actions.

Initiating the process of mainstreaming through exposures and interactions

The members from the Birhor and Kamar communities from Jharkhand and Chhattisgarh respectively have participated in three National conventions held at Kolkata in the months of August and October 2019 and February 2020 where they have got the opportunity to interact with members from other tribal communities as well as non tribal community members from different states of India that have provided them the opportunities for interaction, learning and understanding the process of mainstream development. The presentation made by the Birhor and Kamar members as well as their participation in the cultural program has boosted up their level of confidence, motivation and feeling of inclusion.

POLICY SUPPORT FOR UPSCALING AND REPLICATION

There has been number of policies and Acts in the country that facilitates the process of livelihood development for the tribal communities including Forest Rights Act 2005, CAMPA Act 2018. The CAMPA guidelines put provisions for promotion of agroforestry, community nursery, organic farming etc., as the special components of the entry point activities. The guidelines of Ministry of Environment, Forest and Climate Change (MoEF&CC) also suggest focusing on the importance of management of forest fringe areas by catering to the needs of the people at the fringe areas only. It will help both in meeting the needs of the people and reducing biotic pressure on forest. The guidelines by the Working Plan Code 2014 of the MoEF&CC stress upon the role of trees outside forests (TOF) which are located on the lands other than forests, including agricultural lands through promotion of agroforestry systems and farm forestry which would promote conservation based livelihood development for the forest fringe tribal communities.

CONCLUSION

The tribal community in general and the PVTG in particular, require a focused socio-ecological approach to integrated landscape management for conservation based sustainable livelihood development. The tribal lifescape is interwoven with the forest mosaic landscape and Integrated Landscape Management can only address the issue of sustainable livelihood development of the small holder and land less tribal community. The socio ecological approaches to involve the community, changing their world view, developing new social order and institutions for participatory governance and management of the natural ecosystems, building capacity of the community to conserve and manage the natural resources and adopt new technologies to increase conservation based production and productivity for sustainable livelihood development while maintaining the multi functionality of the agro forest mosaic landscape for co production of host of ecosystem services would provide the way out to address the issues of sustainable livelihood development and well being of the tribal communities.

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